AURA TES – 2 YEARS ON ORBIT

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DC8 photo of Mexico City by Cameron McNaughton, University of Hawai`i , Feb 2006

Jet Propulsion Laboratory
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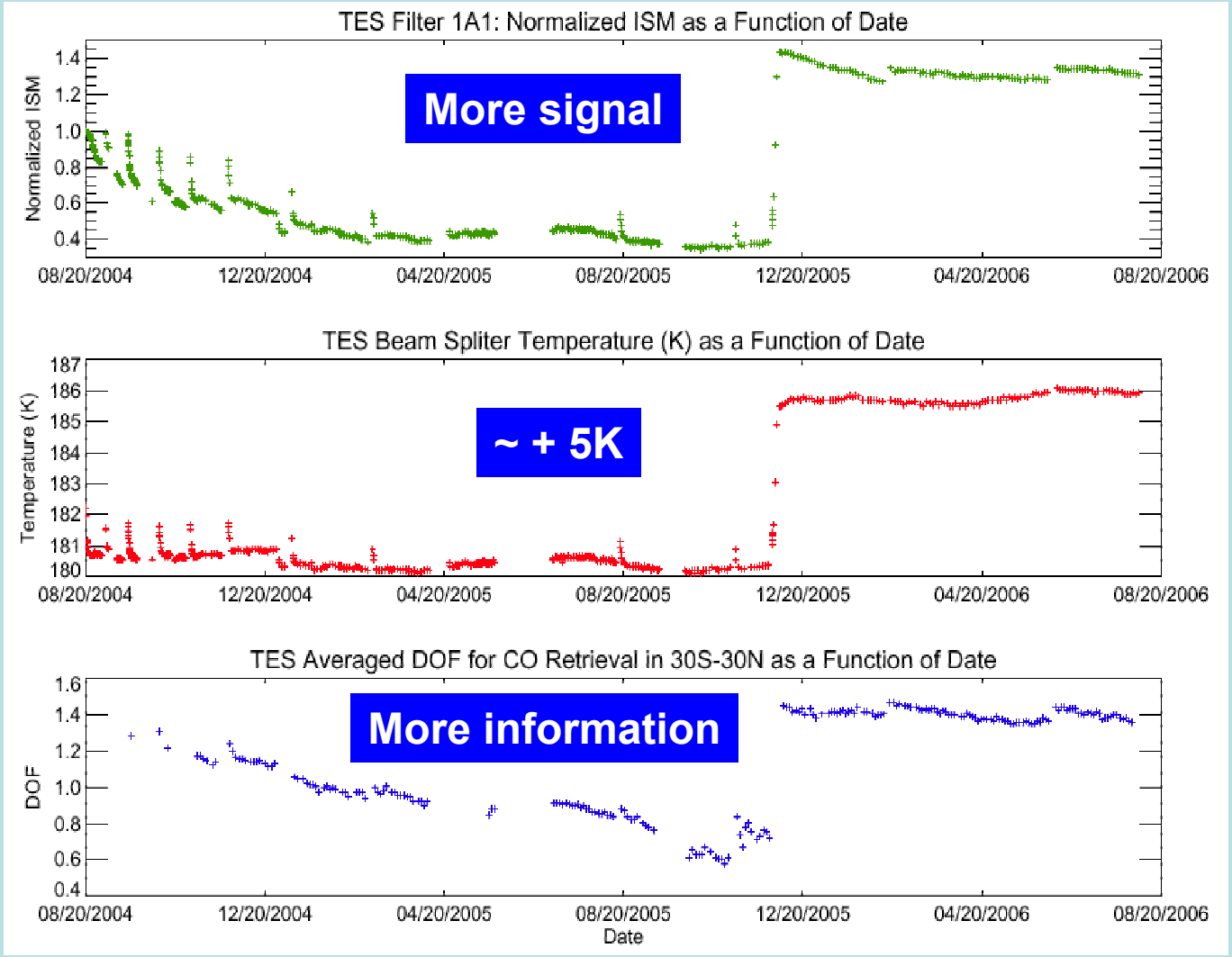
TES Instrument Status

- **TES, with occasional glitches, is working excellently.**
- **The optical bench warm-up in Dec 2005 resulted in a dramatic rise in signal at the shorter wavelengths**
  - **Also improved longer wavelengths, but to a lesser degree**
- **All data are being archived at the Langley DAAC within a few days of receipt**
  - **as of 9/1, 273 Global Surveys + 717 Special Observations**

Result of the Optical Bench Warm-Up 12/05



TES L2 Data Products Update

- **TES "Version 2" data have been processed for all TES runs acquired since launch**
  - **All processing goals were met for this version**
- **There are significant improvements over previous versions:**
  - **L1B calibration improved**
    - **differences with AIRS brightness temperatures decreased from ~2K to < 0.5K**
  - **L2 algorithms have been refined**
  - **More extensive quality control information is provided**
- **Version 2 includes HDO as a standard product**
- **Version 2 includes the first limb retrievals**
  - **Stratosphere only for this version**
- **All data are available at the Langley Atmospheric Sciences Data Center (ASDC)**
- **Information on using TES data can be found in the *TES L2 Data User's Guide,* which is available at the Langley ASDC or the TES website.**

TES L2 Data Validation Overview

- **TES Version 2 Nadir ozone data show improvements by comparisons to both ozonesondes and lidar** (Talks by R. Nasser, N. Richards and H. Worden in the Total/Trop Ozone Validation subgroup).
- **Carbon monoxide measurements taken after Dec 6, 2005 are significantly improved after an optical bench warm-up** (Talk by M. Luo in the CO Validation subgroup).
- **Validation results for nadir profiles of water, temperature and HDO look promising** (Talks by R. Herman in the Water and Temperature Validation subgroups).
- **Limb data for nitric acid, ozone and temperature are in the preliminary stages** (Talk by S. Kulawik in the HNO_3 Validation subgroup).

➢ **A summary of the status of TES L2 validation will be provided in the TES L2 Validation Report (v2.0) available in October 2006.**

➢ **TES version 2 nadir data for ozone and carbon monoxide are validated and are appropriate for scientific studies by the atmospheric community.**

➢ **TES version 2 nadir water, temperature and HDO are provisionally validated and can be used (with caution) for scientific analysis.**

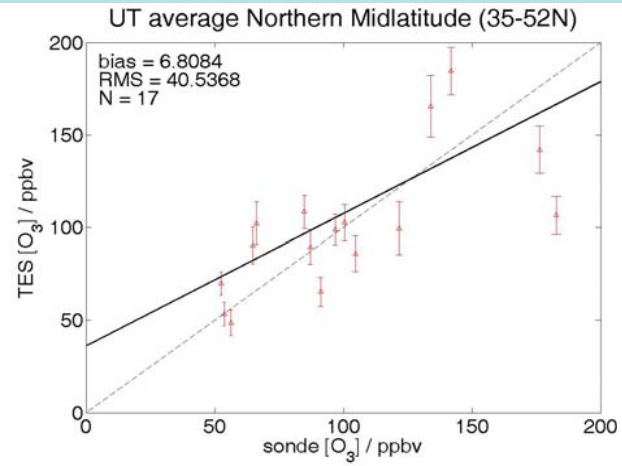
TES Validation Status (as of Sep 2006)

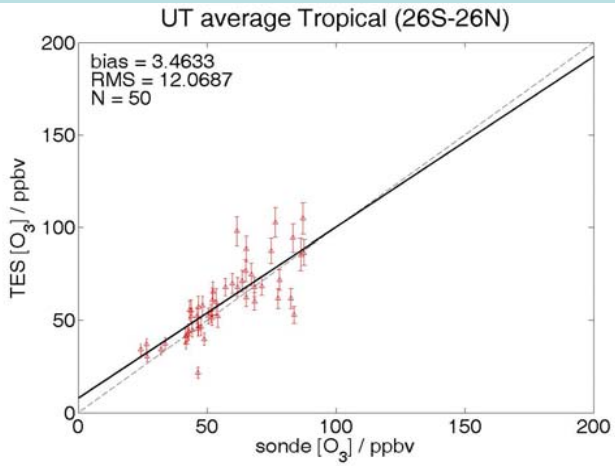
Species	Validation Status
Nadir Ozone	Validated
Nadir Carbon Monoxide	Validated
Nadir Water	Provisionally Validated
Nadir Temperature	Provisionally Validated
Surface Temperature	Provisionally Validated
Nadir Methane	Not Validated (2007)
Nadir HDO	Provisionally Validated
Limb Nitric Acid	Not Validated (2007)
Limb Ozone	Not Validated (2007)
Limb Temperature	Not Validated (2007)

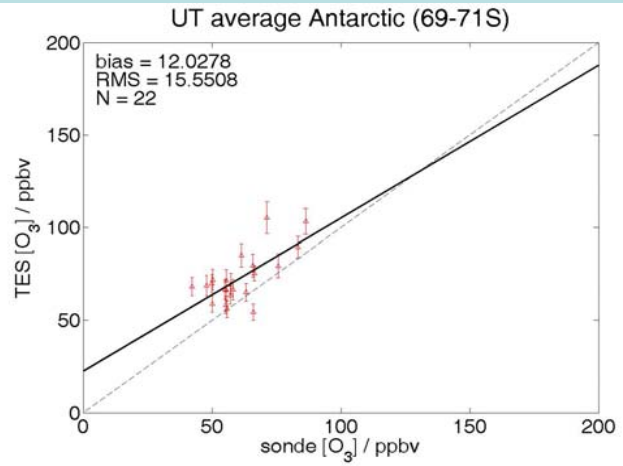
TES Version 3 Data

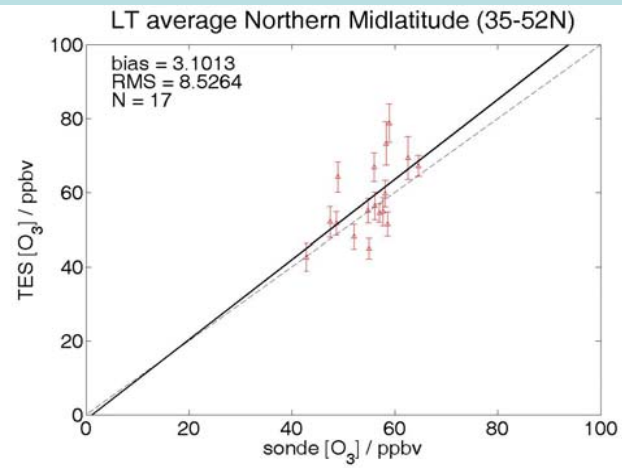
- **The next version of TES data will include:**
  - **Limb profiles with retrievals in the upper troposphere**
  - **Further improvements to the temperature retrieval due to updated CO2 spectroscopy from AER - (Talk by S. Clough in the Radiance Validation sub-group)**
  - **Species dependent quality control information**
  - **Use of GMAO GEOS-5 products in L2 retrievals**
- **TES Version 3 data products will begin to be available shortly after the GEOS-5 forward processing data stream begins.**
  - **Complete reprocessing complete 4-6 months after beginning of V003 data stream**

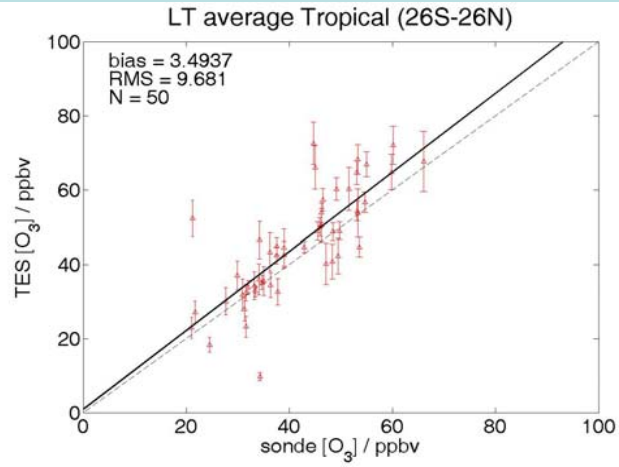
TES vs. sonde ozone upper trop (UT) and lower trop (LT) average correlations in 3 latitude zones

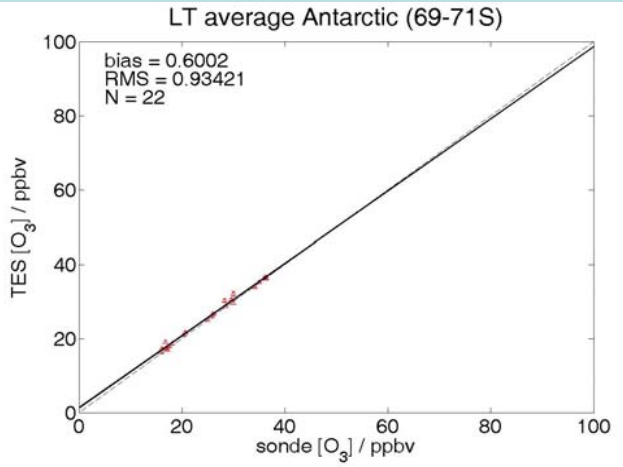






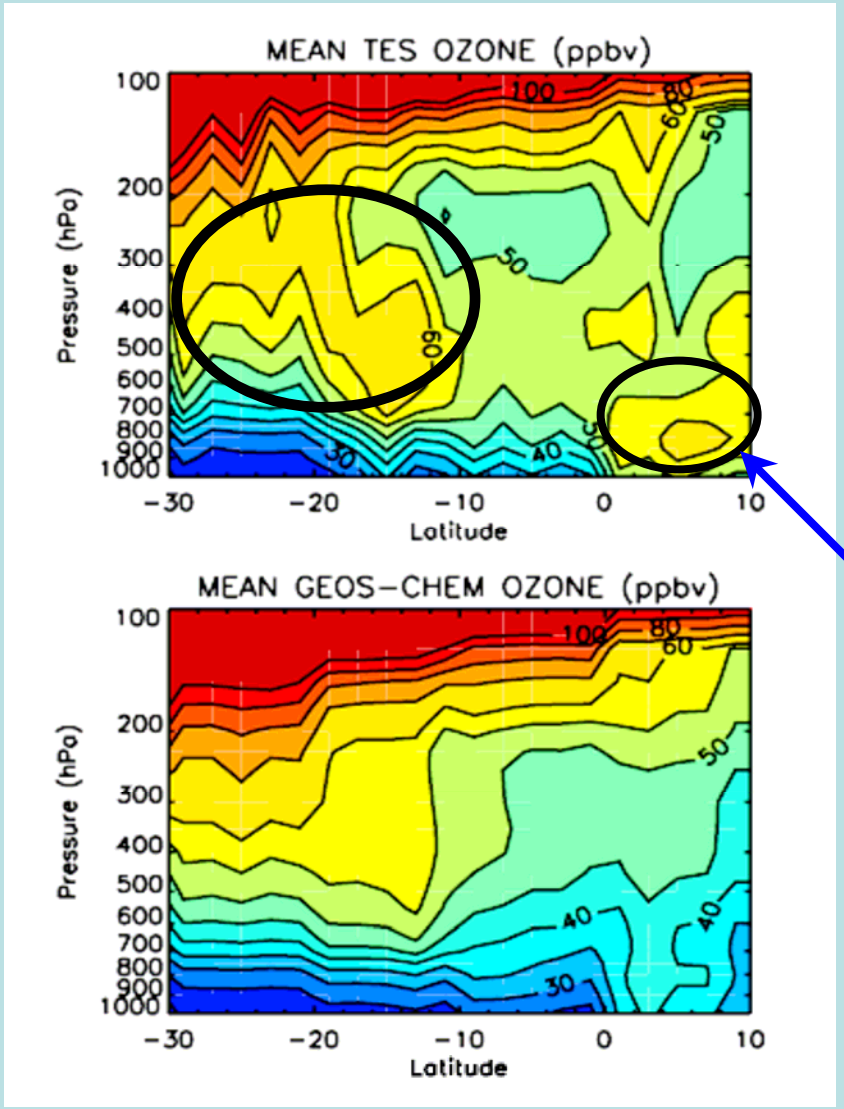


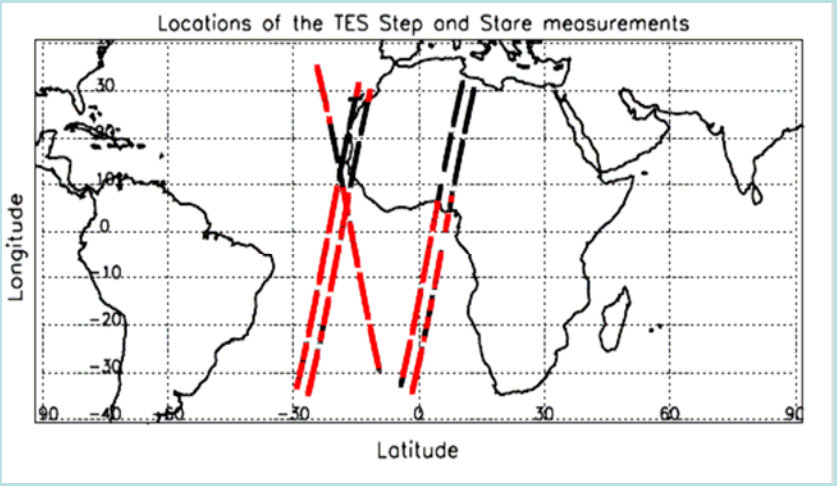




Talk by R. Nasser, Trop Ozone Validation Session, Tuesday pm

Latitude vs Pressure O_3 Cross Sections from TES over the Tropical Atlantic during the Northern Africa biomass burning season in 2005



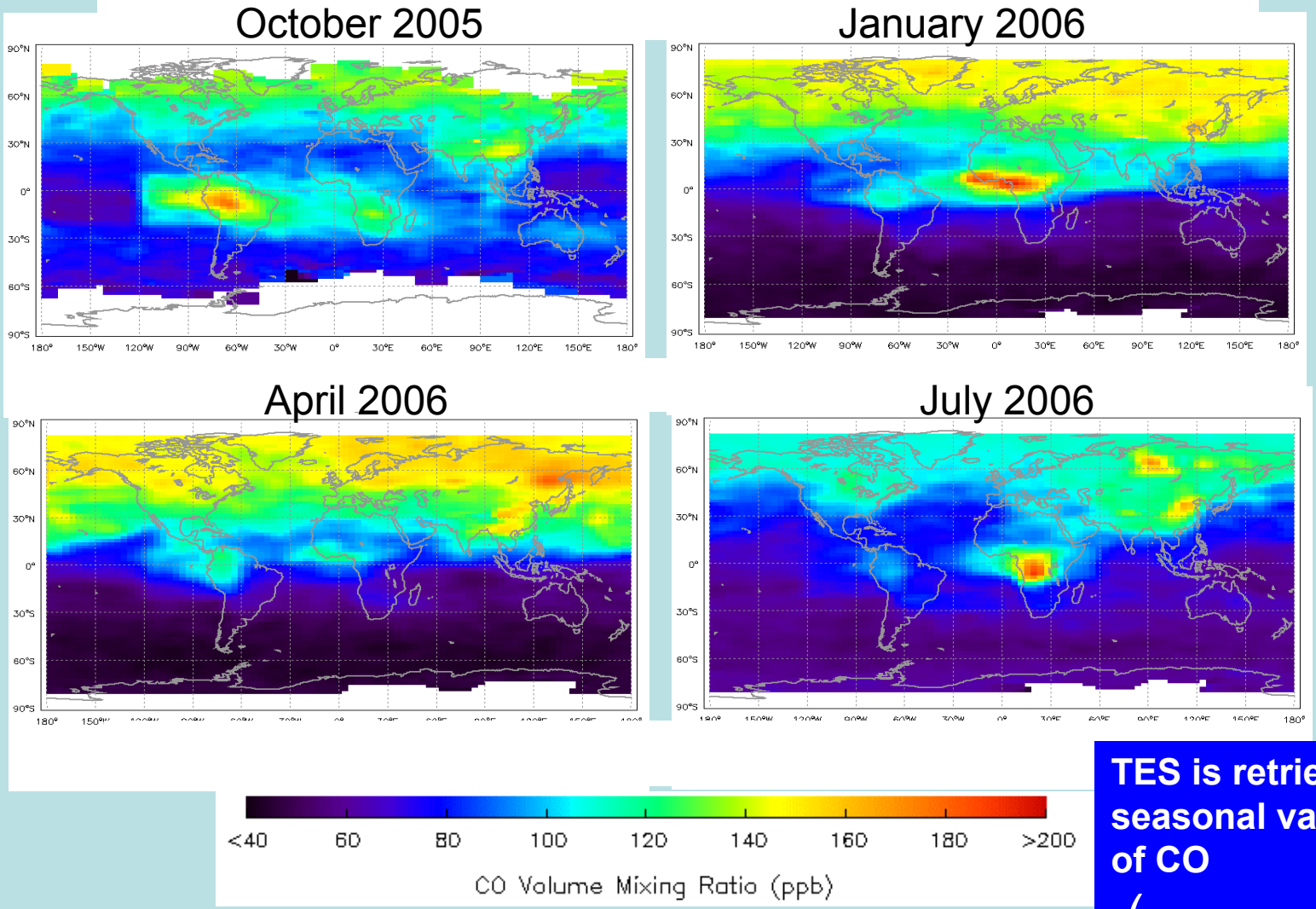


For the first time, elevated lower trop ozone has been *directly* measured 0° – 10° N over the tropical Atlantic Ocean

(L. Jourdain et al. , submitted to GRL)

For more recent results using Global Survey Data, see H. Worden *et al* poster

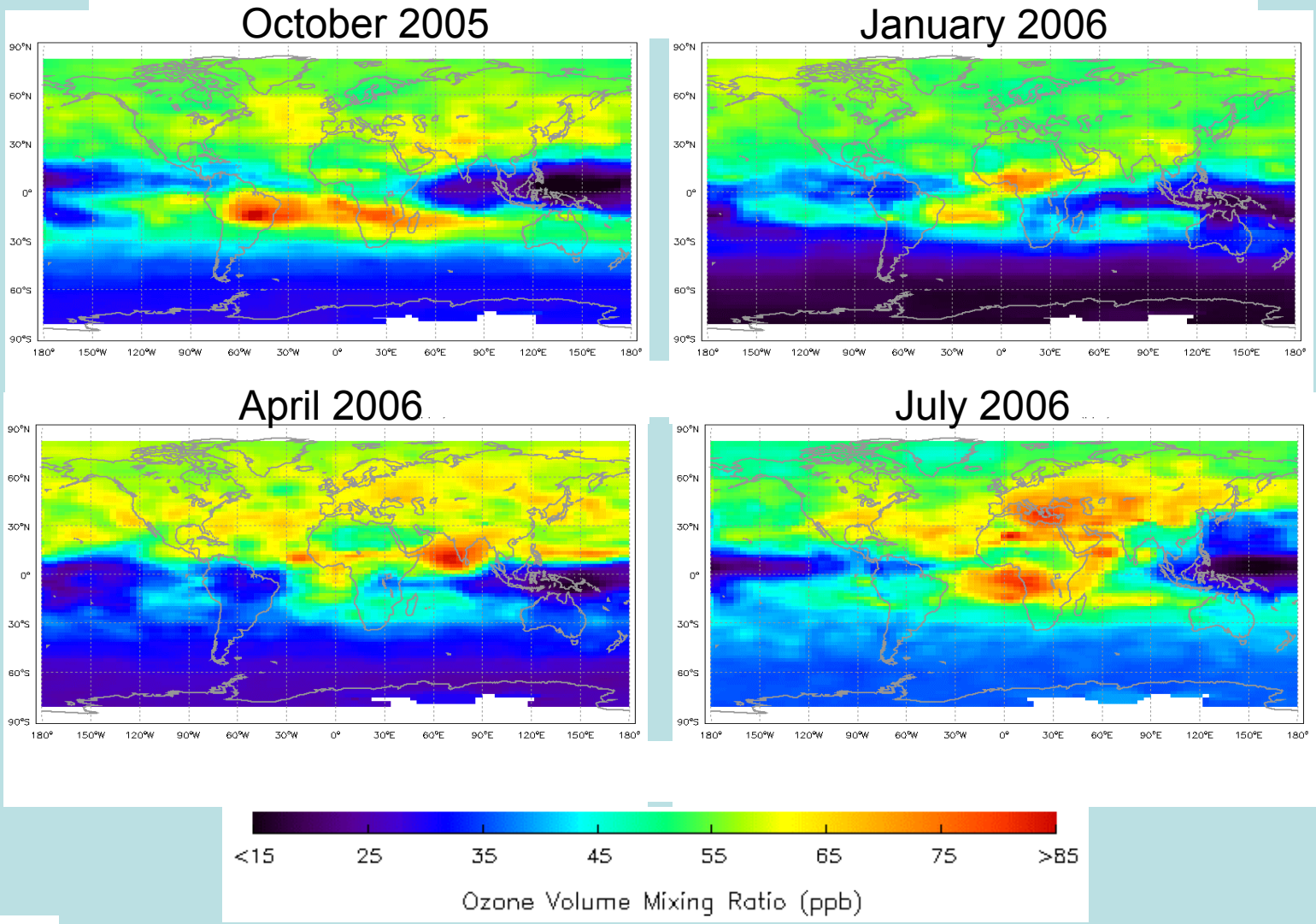
TES CO Monthly Means at 681.3 hPa



TES is retrieving the seasonal variation of CO

(M.Luo talk, Tuesday)

TES Ozone Monthly Means at 681.3 hPa

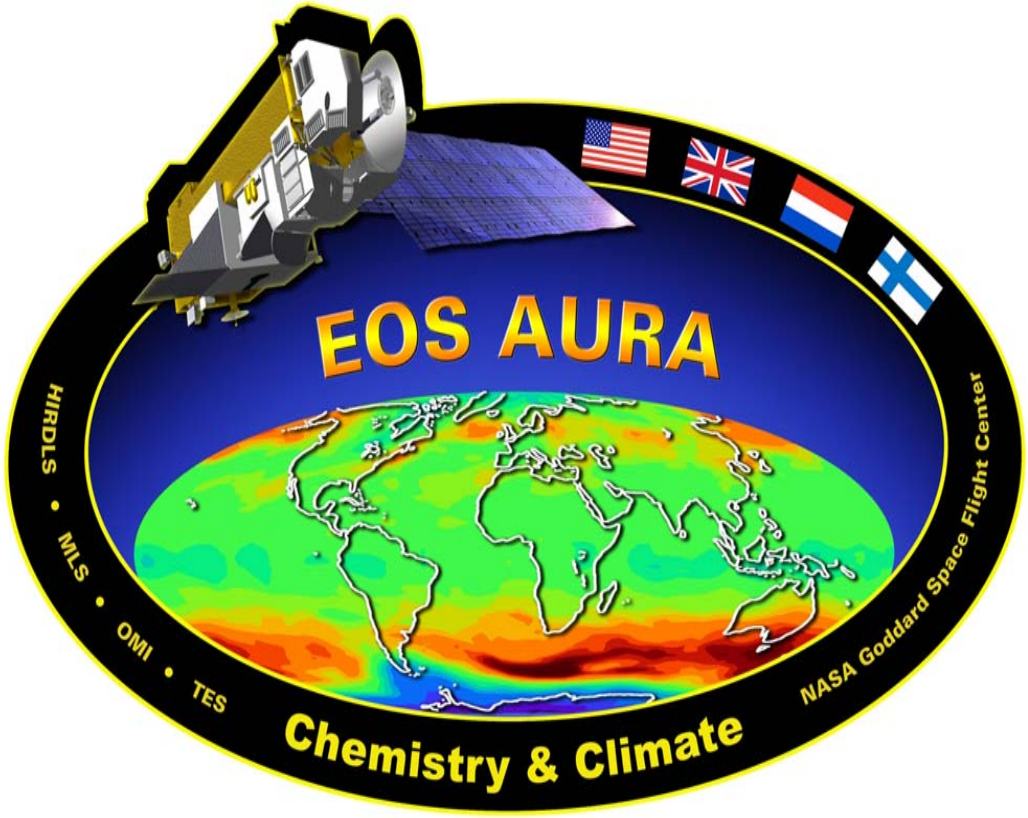


The Future is Looking Down

It is evident (e.g., from the February 2006 Workshop on Air Quality) that the future of tropospheric remote sensing lies in a *reliable* extension of the profiles down into the boundary layer.

One approach is to combine UV-Vis measurements with IR (Don't miss the grand finale of this meeting by J. Worden!).

The TES team is working with members of the OMI team to refine this concept.



For more information, go to http://tes.jpl.nasa.gov

BACKUP

Proposed Papers for Aura Validation Special Issue (March 1, 2007)

- **Update on validation of ozone profiles using ozonesondes** (H. Worden, J. Logan *et al*)
- **Comparison of TES ozone profiles to lidar measurements during INTEX-B** (N. Richards)
- **Validation of TES total and tropospheric ozone column data** (G. Osterman)
- **Update on validation of TES carbon monoxide data** (M. Luo)
- **Validation of TES L2 water products** (R. Herman)
- **TES temperature data validation** (R. Herman)
- **Validation of TES cloud algorithm** (A. Eldering)

Note: Limb validation results will not be ready until mid- 2007

Future Validation Measurements Needed by TES

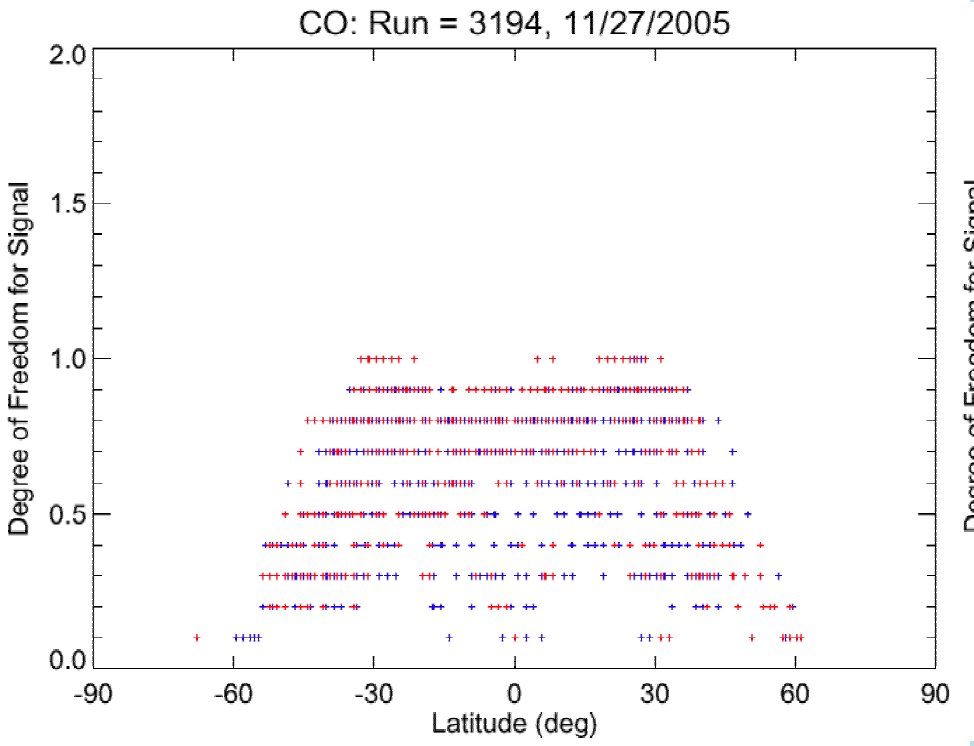
- There is a significant volume of data to validate current TES L2 data profiles and any future data updates.
- Ozonesondes and aircraft lidar comparisons continue to be the primary datasets used for validation of TES ozone.
- TES carbon monoxide, temperature and water validation is done using some combination of aircraft, sonde and satellite data.
- TES nitric acid is being validated using MLS data and aircraft data.

➢ In general, we do not have a pressing need for more validation data collection at mid-latitudes or in the tropics.

➢ More validation data in the troposphere for latitudes poleward of 50° during Spring and Summer would be very useful.

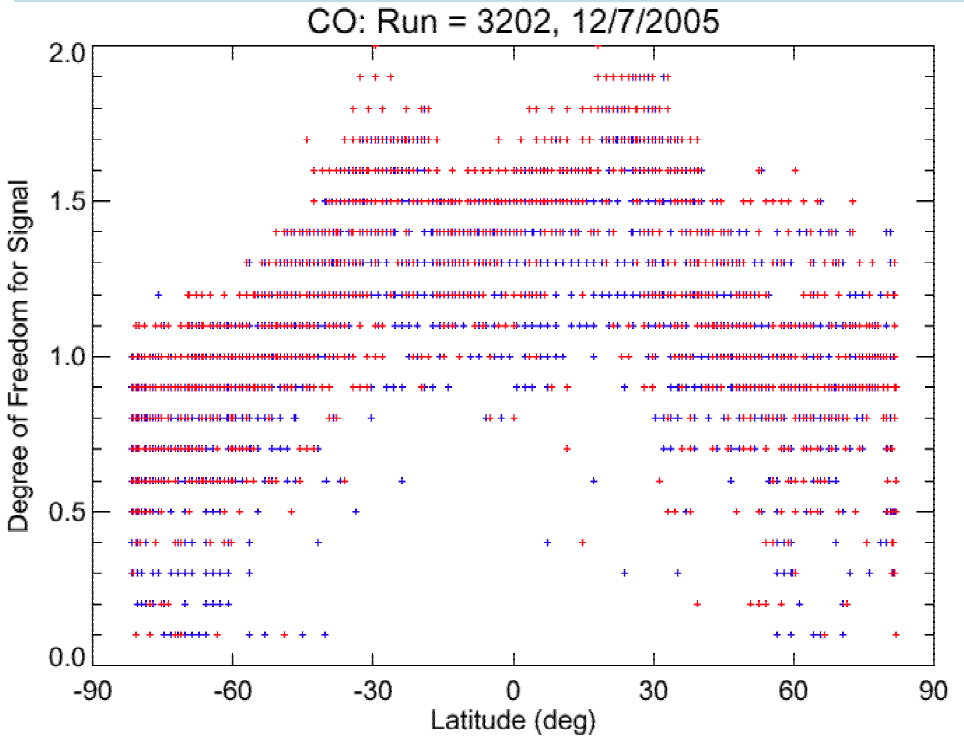
CO: Degrees of Freedom for Signal (DOF)

Pre-Warmup



30S-30N: DOFs = 0.72

Post-Warmup



30S-30N: DOFs = 1.45